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GENERAL NOTES.

BOTANY.[1]

CROSS-FERTILIZATION OF ARISTOLOCHIA. — Mr. H. G. Hubbard, now traveling in Jamaica, has communicated to a Western paper some interesting notes on the natural history of the island. His observations on *Aristolochia* are fully confirmatory of the studies of others in the case of *Aristolochia clematitis.* "I have had an opportunity of examining the flowers of *Aristolochia grandiflora*, the 'Dutchman's pipe,' called here the 'John Crow,' or 'carrion flower,' from the putrid stench which it exhales. This flower is one of the largest known. The tube or bowl, about a foot long as it hangs from the vines, makes a very good imitation of the Dutchman's china pipe, but the mouth of the bowl turns forward and expands eight or ten inches in diameter, and from the lower edge of this dangles a slender tail, about a foot long. The whole flower is spotted green and purple, like a diseased liver. Notwithstanding its vile odor and uncanny look, it is the most interesting of flowers. The tube is divided into three chambers by constrictions and valves furnished with backward-pointing bristles, the whole forming a trebly guarded fly-trap. The outer chamber alone gives out the carrion odor, attracted by which, insects enter, and finding themselves deceived try to escape, but the long, recurved bristles which line the walls entangle them when they turn back, but favor their progress through the second trap and into the second chamber beyond. Finally they find their way through the third and last trap, into the third chamber. And here you will find small flies and beetles by dozens, if you open the blooming flowers. Now what is the object of this evident contrivance? The flower is not insectivorous. The entrapped insects are always found alive and in good condition, no dead ones in any of the chambers. In fact, the last one, which they must eventually reach, and which also contains the floral organs, seems to have been especially contrived for their comfort and convenience. It is spacious, unencumbered with bristles, except just about the entrance, where a perfect forest of them renders escape into the preceding chamber impossible, and moreover about the floral organs an abundance of nectar supplies them with food. There is a fine stumbling-block in the way of the believer in the laws of cross-fertilization. As Professor Gray would say, this plant seems to be formed on the plan of 'how not to do it.' Skeptics have pointed triumphantly to the *Aristolochia* as a plant which, with the utmost ingenuity, has provided for insuring self or close fertilization. They had opened flowers in full bloom, found the anthers pouring forth pollen, and the imprisoned insects skipping about the inner chamber completely dusting themselves and its walls with the yellow grains. The stigmatic surface, too, had long been fertilized, its lobes had closed, and having performed its office the pistil was withering away. The fact of self-fertilization in this plant seemed proved. Nature, however, does not disclose all her secrets on the first inspection, and a more careful study of this flower in all its stages will show that its wonderful machinery is contrived solely for securing cross-fertilization through the agency of insects, and that it cannot fertilize itself. In fact the anthers and stigma in any flower *are never open at the same time.* The mystery is explained when we examine the flowers that have blossomed and are withering: *the trap is open and the insects all flown.* Each of the three constrictions, which were at first so narrow as only to admit of a small insect pushing its way between the hairs, is now gaping widely open, and all the bristles so wilted and flaccid as to offer no impediment to their escape. Now turning to a bud just bursting into flower, we find the bristles rigid and the trap set. The stigma is now widely open and ready to receive pollen, but the anthers tightly closed and their pollen quite green. Each flower has then a double duty to perform: first, to catch insects which have been liberated by some flower previously in bloom, and to effect its fertilization with the pollen which they bring; second, to feed and hold them there until its stigma has closed and its anthers burst. And, finally, it opens its trap and sends them forth with unimpaired vigor and a fresh load of pollen for the next flower that blooms." — (Kingston, Jamaica, February 28, 1877.)

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[1] Conducted by PROF. G. L. GOODALE.

PINUS MITIS. — The attention of botanists living in the Middle States is directed to this tree, which has become rare in the North. As one of the most valuable of North American timber trees, attention has been drawn to this species as suitable for forest culture in many parts of the United States, and it is desirable to procure seed for this purpose from as far North as possible. According to the younger Michaux, *Pinus mitis* was found in his time in New York, Connecticut, and Western Massachusetts, and Mr. Lapham includes it in his catalogue of Wisconsin plants, but there is no evidence that this tree grows so far north at the present time.

Botanists finding *P. mitis* in the States above mentioned, or in Pennsylvania, New Jersey, Ohio, or Michigan, are requested to communicate with the director of the Botanic Garden of Harvard University, Cambridge, Mass. — C. S. SARGENT.

FLUORESCENCE OF CALYCANTHUS. — A decoction of the bark of the *Calycanthus floridus*, also known as "sweet shrub," is strongly fluorescent. My attention was recently drawn to this fact in examining a mixture of the bark in glycerine, which I had prepared in order to extract the pleasant odor of its essential oil. The vial containing the bark and glycerine when looked at askance emits a rich, bluish shimmer. On comparing a decoction of the bark of this shrub with that of the *Æsculus*, or buckeye, by concentrating the sun's rays with a lens into a cone of light passing through the liquids, I discovered that the Calycanthus decoction is strikingly superior in intensity and purity of blue color in the fluorescing cone to the Æsculus decoction. — ROBERT TOOMBS, M. D., Washington, Georgia.

ON THE TRANSFORMATION OF CRYSTALLIZABLE SUGAR INTO CELLULOSIC PRODUCTS. — M. Durin gives in *Annales des Sciences Naturelles* (iii. No. 4–6) a detailed account of a peculiar fermentation observed by him. Under certain conditions, a solution of crystallizable sugar is converted into cellulose either firm and organized, or swollen, and into inverted sugar. He has never noticed the formation of cellulose from glucose.

RESPIRATION OF ROOTS. — Two different functions have been confounded under the term respiration, namely, assimilation and true respiration. The first of these takes place only through the agency ot chlorophyll or its equivalent, and under the influence of light; the latter is common to all plant organs when growing or working. Assimilation is a process characterized by the production of carbhydrates from carbonic dioxide and water, with disengagement of oxygen; respiration involves the oxidation of assimilated matter and is accompanied by the formation of carbonic dioxide. Dehérain and Vesque have lately reëxamined the subject of root respiration, and they have published the following results: —

First: oxygen is necessary for all plant organs. It is not enough for a living plant to have its upper part in the air; it is requisite that the roots themselves should find oxygen in the atmosphere of the soil. Second: absorption of oxygen by the roots is attended by only a slight evolution of carbonic acid; thus roots produce a partial vacuum in the receptacles in which they are confined. Third: the disengagement of carbonic acid takes places as well in an atmosphere deprived of oxygen as in an atmosphere containing it; whence we may conclude that the carbonic acid evolved does not come from a superficial oxidation of organs in a state of decomposition, but as a consequence of the circulation of gases in the plant.

THREE FEET OF FERN-SPORES. — Bureau and Poisson have examined a substance found in large quantities in a cave at Reunion Island. The cave is ten metres in depth by six metres square, and is covered to a depth of more than a metre by a yellow, soft, insipid, inodorous substance, which crumbles under the fingers to an impalpable powder. The dry powder burns without flame or odor, but when moistened gives off during combustion much smoke and odor of a burning plant. By exclusion they have decided that this matter consists of the spores of species of ferns, probably Polypodiaceæ. The spores are not those of Lycopodiaceæ, according to the writers, but they have the shape, markings, and *color* of the spores of the Polypodiaceæ with large fronds now occurring on the island.

HEATHER IN NOVA SCOTIA. — Professor Lawson adds to the localities of *Calluna vulgaris* on this continent six other stations, and in an interesting paper on the subject gives the following as his conclusions: *Calluna vulgaris* is an indigenous plant, and still exists as such in very small quantity on the peninsula of Halifax. In Point Pleasant Park, at Dartmouth, and possibly in other places, the stations for the plant are artificial, but the plants are probably native. "The various traditions as to the foreign origin of the heather are not unlikely to have been suggested by the desire to account for the presence of what was regarded as necessarily a foreign plant rather than by actual historical facts."

Broom in Cape Breton, and *Rhododendron maximum* at Sheet Harbor, Nova Scotia, are discoveries reported by Professor Lawson.

ANALYTICAL TABLES. — Professor Ordway, of the Massachusetts Institute of Technology, has sent us copies of analytical tables of the orders of Phænogamia, and of the suborders of Cryptogamia. These are careful synopses of the classifications of Lindley, Hooker and Baker, Schimper, Debat, Müller, Rabenhorst, Harvey, Tuckerman, and Cooke. In view of the present lack of any hand-book on Cryptogams, for the needs of general students, the second table may be found convenient. The author has been most painstaking in his work.

ON THE POROSITY OF WOOD. — Professor Sachs has published a preliminary communication on this subject in which he gives the results of his recent observations and experiments. The present treatment of the matter is new in some respects, and the conclusions are interesting. An abstract of these will be given in the next number of the NATURALIST.

IRIS. — Our eastern species of this genus need a thorough revision. The manuals give but two tall species in the Northern States, a broad-leaved and a narrow-leaved one, that is, *I. versicolor* and *I. Virginica* of Linnæus, considering the latter as identical with the *I. prismatica* of Pursh. Now Mr. J. G. Baker, of Kew, in a recent revision of the genus, recognizes two broad-leaved species under the two Linnæan names, and restores Pursh's name for the narrow-leaved plant. Two broad-leaved forms have certainly been cultivated in the European gardens even from the time of Linnæus, and have always been known there by his names and considered distinct. As described by Mr. Baker, and as shown by figures, the most obvious difference appears to be one of size, *I. Virginica* being the taller and stouter, with larger and deeper-colored flowers. Can we find in our wild plants any differences upon which this distinction can be maintained?

Mr. Baker says also that *I. tenax* (a narrow-leaved Oregon species similar to *I. prismatica*) is found in New Brunswick and Canada, and if so it should be looked for within our limits. Moreover the range of all these species is uncertain, especially toward the south, and the southern species generally need revision fully as much as the northern ones. It is probable that careful comparison will reveal new forms from there. The attention of all our botanists is requested to this matter during the coming season, and specimens of flowers, fruit, and roots, fresh or dried, from any part of the country, may be sent to the Botanic Garden, Cambridge, and will be of service. — SERENO WATSON.

BOTANICAL NOTES FROM RECENT PERIODICALS. — *Flora*, No. 4. Schulzer, Notes on Fungi. Batalin, Mechanism of the Movements in Insect-Eating Plants (not yet finished).

Botanische Zeitung, 1877, No. 6. J. B. Jack, On European Hepaticæ (continued in No. 7). No. 8. Pancic, A new Conifer in Servia. Report of Scientific Societies. No. 9. Celakovsky, On the Greenish Ovules of Trifolium repens. (These are often distinctly foliaceous, and are regarded by the author as metamorphosed leaflets of the carpel.) This paper is continued in No. 10.

ZOÖLOGY.[1]

WINTER BIRDS OF ARKANSAS. — Perhaps it will interest the readers of the NATURALIST to know of some birds which make Central Arkansas their winter quarters. The past winter has been the coldest known for many years, with considerable snow. The following list is certainly far from complete, as we have only been observing birds for a single season. Among the thrushes we have occasionally seen our familiar friend, the robin (*Turdus migratorius*), and the hermit thrush (*T. pallasi*), but usually they desire somewhat warmer weather than we have had this winter.

The mocking-bird (*Mimus polyglottus*) is very plenty around old plantation houses, and exhibits the peculiar markings of the Arkansas specimen spoken of by Baird in his Review of American Birds, page 49. It has an unusual amount of white upon its plumage, and the outer tail feathers clear white.

Perhaps the most abundant bird of the past winter has been the bluebird (*Sialia sialis*); its food consists largely of the berries of the black gum (*Nyssa multiflora*).

The diminutive golden-crowned kinglet (*Regulus satrapa*) has been observed, as have the tufted titmouse (*Lophophanes bicolor*), the southern black-capped chickadees (*Parus atricapillus* var. *Carolinensis*), the nuthatch (*Sitta Carolinensis*), and the house wren (*Troglodytes aëdon*). The gay tanager (*Pyranga æstiva*) in his bright red plumage and the female with her more subdued hue have enlivened the landscape all winter.

The snow-bird (*Junco hyemalis*), following the snow-storm southward, was with us in great numbers for about three weeks. The meadow-lark (*Sturnella magna*) is common, so is the noisy blue jay (*Cyanurus cristatus*), proclaiming with harsh notes his close relationship to the crows. The kingfisher (*Ceryle alcyon*) was occasionally seen hovering over the waters of the Little Red River in quest of food.

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[1] The departments of Ornithology and Mammalogy are conducted by Dr. ELLIOTT COUES, U. S. A.